



Relational pre-impact assessment of conventional housing features and carbon footprint for achieving sustainable built environment

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Abstract

Sustainable comfortable living requires comprehensive energy consumption planning for the housing habitat. Besides other energy planning considerations, the variations in physical features of built facilities, their environmental interaction, and resulting operational life cycle carbon footprint are an important focus in contemporary research. Therefore, this research aims to explore the relationship between the physical features of the built facility and the resulting carbon footprint for conventional housing designs. A combination of conventional Malaysian model housing units was developed in 3D virtual prototypes by building information modeling, and regression analysis was used to investigate the environmental impact paradigm of the built facility. Correspondingly, an operational CO₂ pre-assessment was also examined by the partial life cycle assessment technique during the early stages of design and planning. The results of this study show a positive and statistically significant linear relation of carbon footprint with the area, volume, and power rating parameters. The outcome of this study is imperative for designing resource-efficient living facilities and achieving a sustainable built environment through a proactive life cycle assessment of housing construction projects.

Keywords Built environment · Building information modeling · Carbon footprint · Environmental impact · Housing sector · Operational CO₂ · Tropical climate

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